CLAIMS

I claim:

1. A method for forming aerogel comprising the steps of:

a) providing an amount of an alkoxide;

b) providing an amount of a first organic solvent;

c) providing an amount of a catalyst;

d) mixing the alkoxide, solvent and first amount of the catalyst to form a solution in which the alkoxide is precondensed, possibly adding further amounts of catalyst over a period of time (optional);

e) providing a second amount of the catalyst;

f) mixing the second amount of the catalyst with the solution to form an alcogel; and

g) supercritically drying the alcogel to form an aerogel.

2. The method of claim 1 wherein the catalyst is a base or acid.

3. The method of claim 1 further comprising the step of optionally replacing the first organic solvent with a second organic solvent prior to supercritcally drying the alcogel.

4. The method of claim 3 wherein the non-flammable solvent is carbon dioxide can be optionally exchanged for the gel solvent.

5. The method of claim 3 wherein the step of replacing the first organic solvent with the second organic solvent comprises the steps of:

a) providing a manuclave or other high-pressure vessel (such as a supercritical dryer) including a tank, a liquid drain valve on the tank, a valve assembly disposed on the tank and spaced from the drain valve, and a cap releasably secured to the tank;

b) placing the alcogel in the tank;

c) filing the tank with a solvent;

d) draining the first solvent through the drain valve.

6. The method of claim 5 further comprising the step of cooling the tank after introducing the second solvent.

7. The method of claim 5 further comprising the steps of:

a) heating the tank after draining the first solvent; and

b) depressurizing the tank.

8. The method of claim 1 further comprising the step of waiting a specified amount of time after mixing the alkoxide, the first solvent and the first amount of the catalyst.

9. The method of claim 8 wherein the specified amount of time is between about 3 hours and about 48 hours.

10. The method of claim 9 wherein the specified amount of time is between about 15 hours and about 20 hours.

11. The method of claim 1 wherein the step of mixing the alkoxide, the first solvent and the first amount of the catalyst is performed in a mold.

12. The method of claim 1 wherein steps (a)-(f) take place in a state of altered gravity.

13. An aerogel formed from a process comprising the steps of:

a) providing an amount of an alkoxide;

b) providing an amount of a first organic solvent;

c) providing a first amount of a catalyst;

d) mixing the alkoxide, first solvent and first amount of the catalyst to form a solution in which the alkoxide is precondensed, possibly adding further amounts of catalyst over a period of time (optional);

e) providing a second amount of a catalyst;

f) mixing the second amount of the catalyst with the solution to form an alcogel; and

g) supercritically drying the alcogel to form an aerogel.

14. The aerogel of claim 13 wherein the alkoxide, the first organic solvent and the first amount of the catalyst are mixed in a mold.

15. The aerogel of claim 14 wherein the mold is shaped to form the aerogel into a block having a number of pegs and a number of holes capable of interconnecting blocks with one another.

16. The aerogel of claim 14 wherein the aerogel can be used to form a fabric fiber.

17. The aerogel of claim 14 wherein the aerogel can be laminated to increase the strength of the aerogel.

18. The aerogel of claim 17 wherein the aerogel is laminated with the component selected from the group consisting of: an epoxy, a plastic, and silica.

19. The aerogel of claim 13 wherein the process further comprises the step of waiting a specified amount of time after mixing the alkoxide, the first solvent and the first amount of the catalyst, with the amount of time determining the properties of the aerogel.

20. The aerogel of claim 19 wherein the specified amount of time is between about 3 hours and about 48 hours.

21. The aerogel of claim 13 wherein the aerogel is transparent.

22. The aerogel of claim 21 wherein the aerogel shows reduced blue-violet Rayleigh scattering.